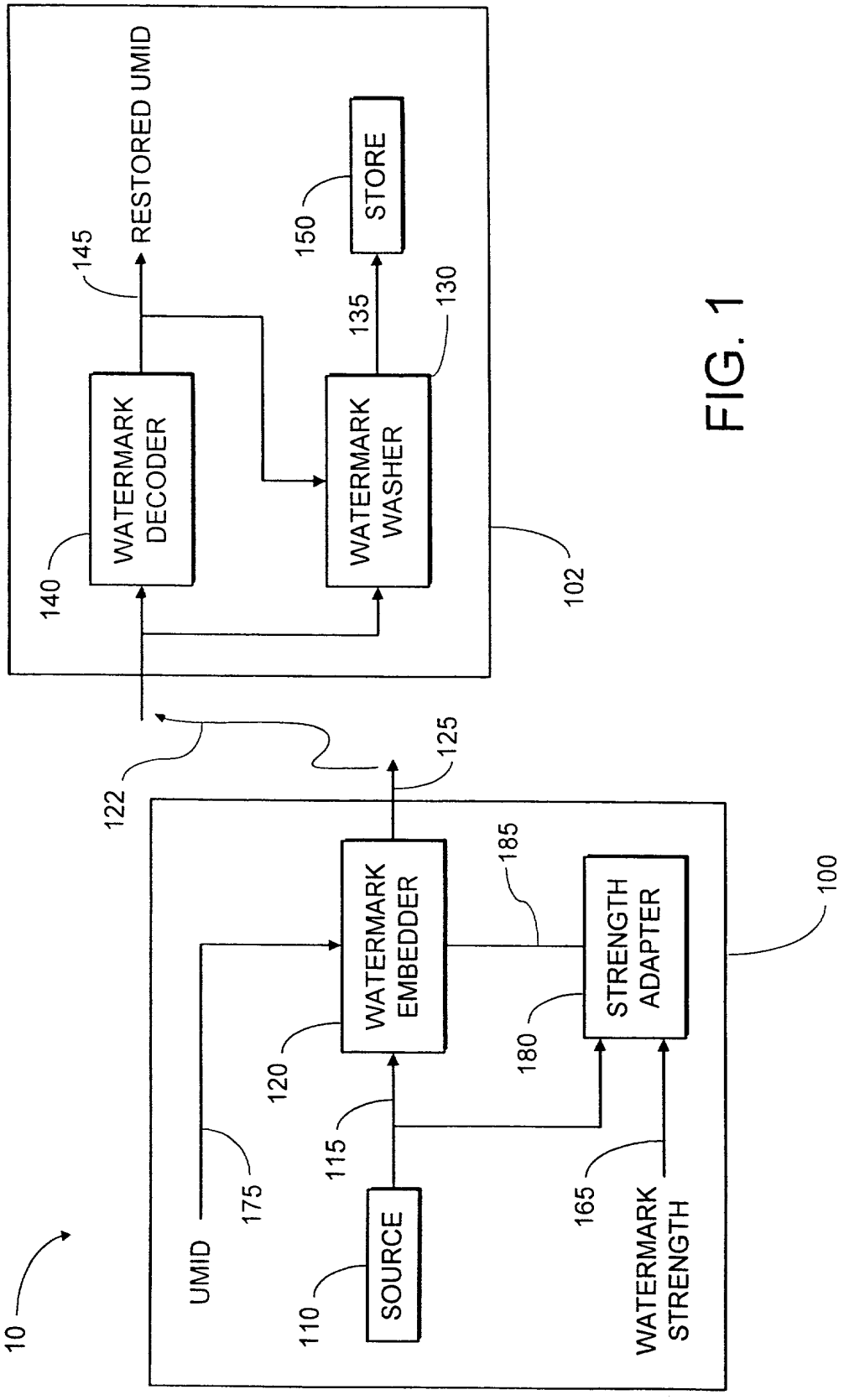

10
100
102
110
SOURCE
115
120
WATERMARK EMBEDDER
122
125
130
135
140
WATERMARK DECODER
145
RESTORED UMID
150
STORE
165
WATERMARK STRENGTH
175
UMID
180
STRENGTH ADAPTER
185
WATERMARK WASHER

FIG. 1

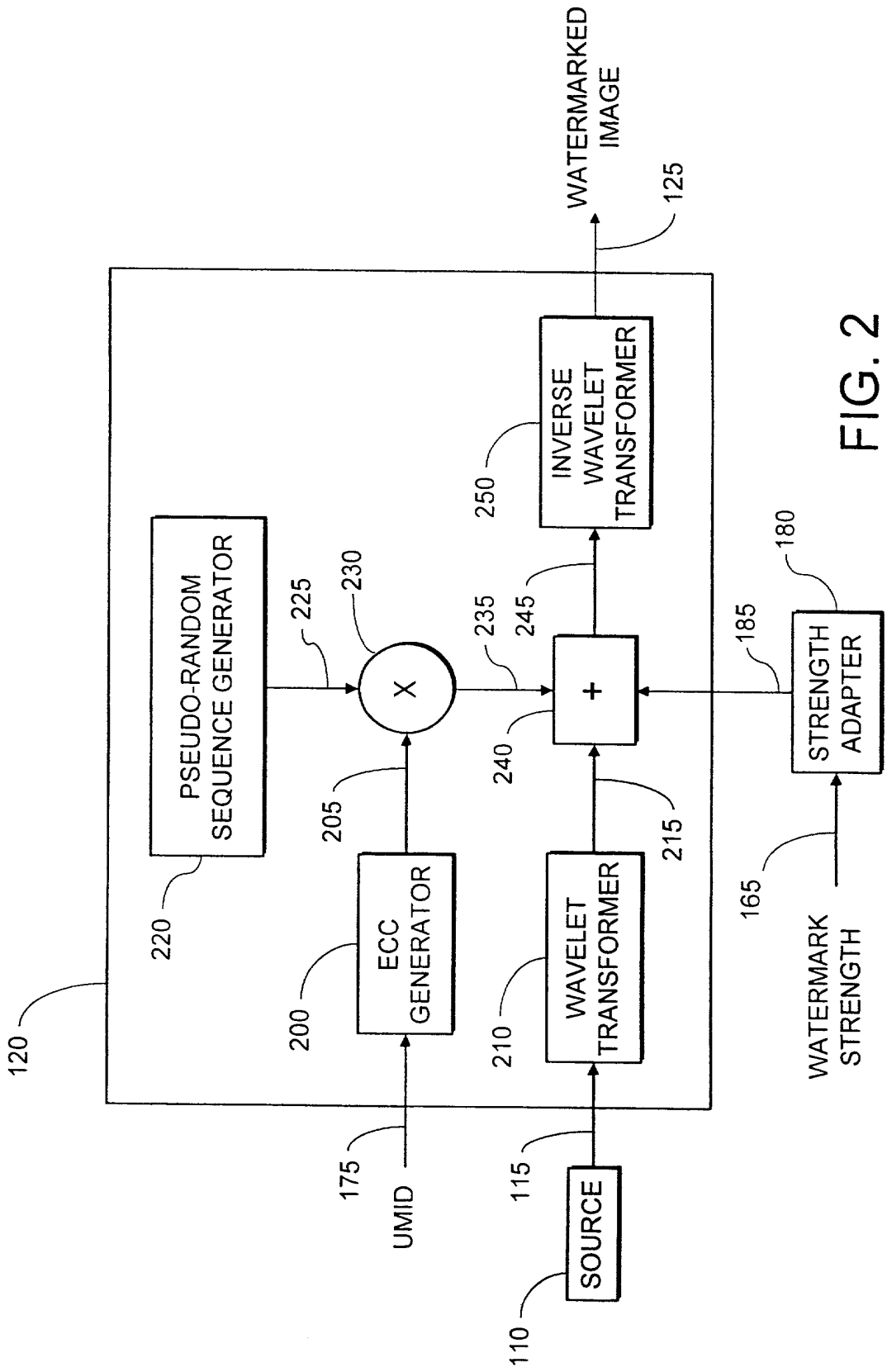

WATERMARKED IMAGE
125
INVERSE WAVELET TRANSFORMER
250
PSEUDO-RANDOM SEQUENCE GENERATOR
220
225
230
X
235
245
+
240
180
185
STRENGTH ADAPTER
205
ECC GENERATOR
200
215
WAVELET TRANSFORMER
210
165
WATERMARK STRENGTH
175
UMID
115
SOURCE
110
120

FIG. 2

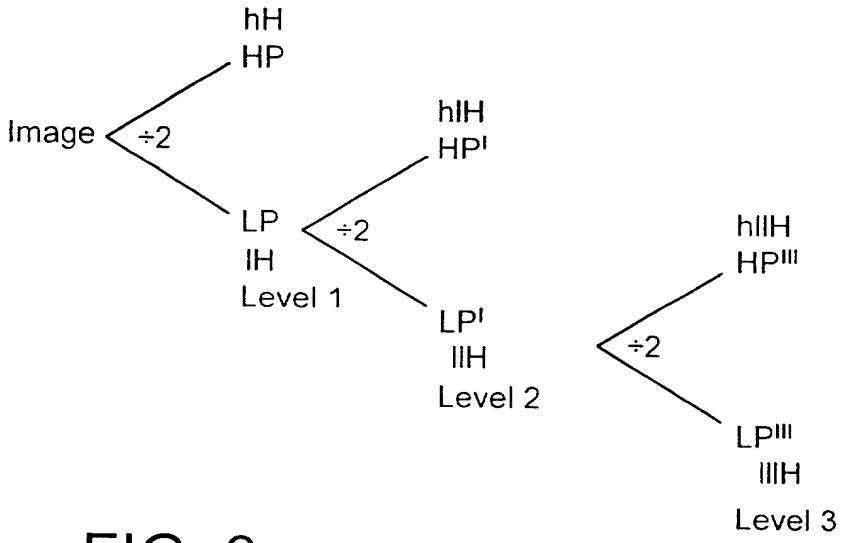


FIG. 3 Schematic of Wavelet Transform

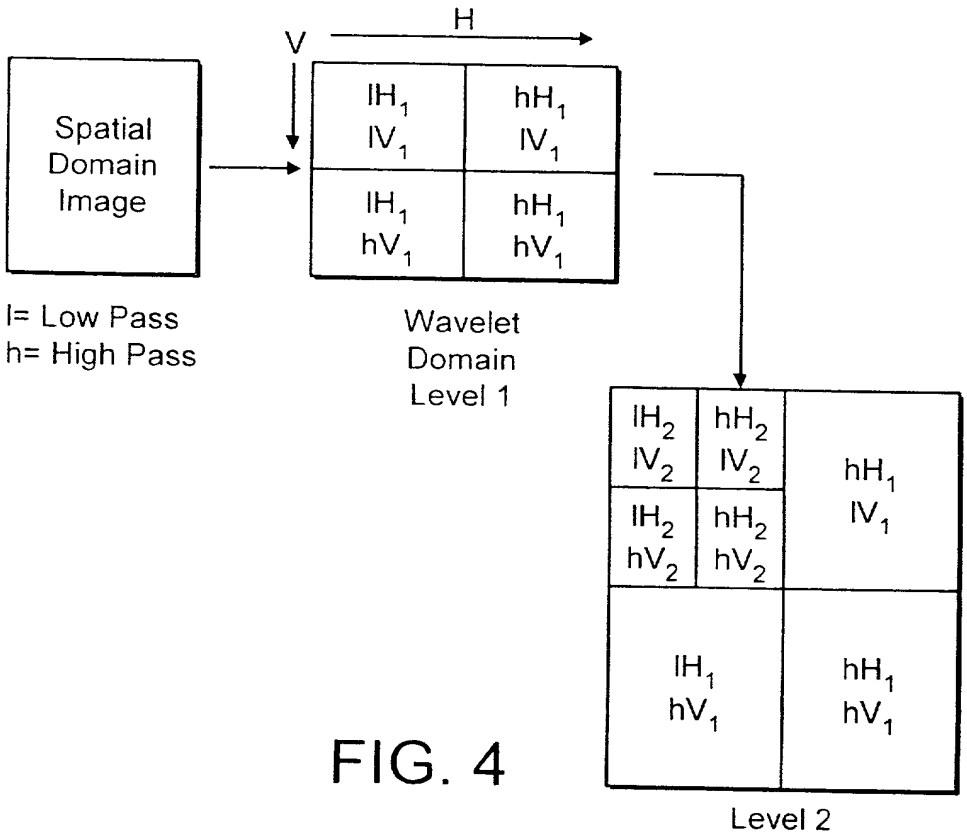


FIG. 4

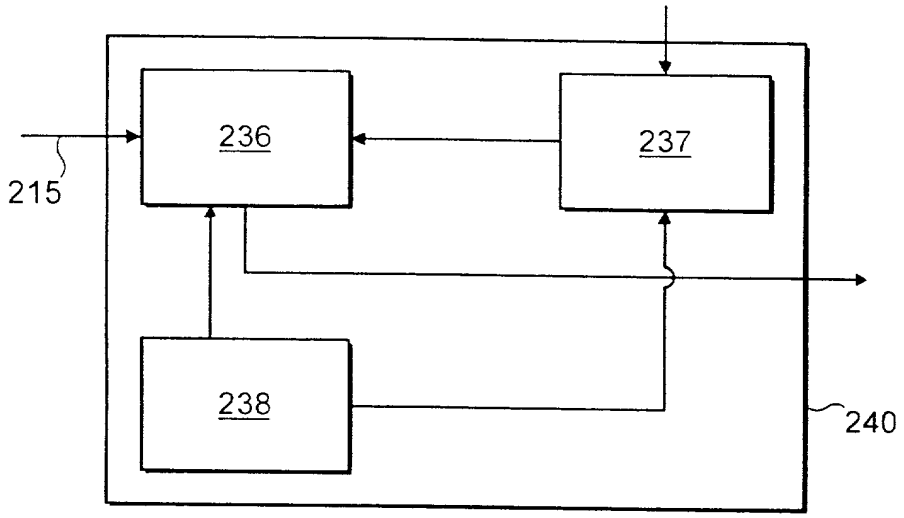

236
237
215
238
240

FIG. 5

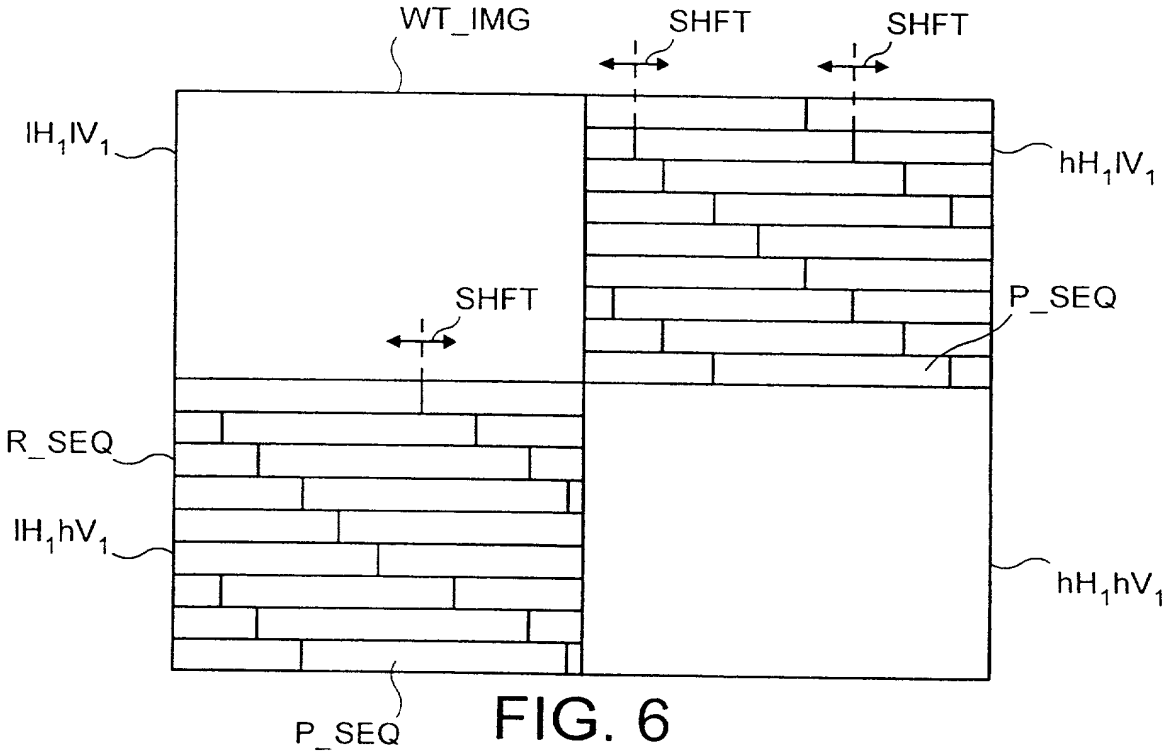

WT_IMG
SHFT
SHFT
IH_1IV_1
hH_1IV_1
SHFT
P_SEQ
R_SEQ
IH_1hV_1
hH_1hV_1
P_SEQ

FIG. 6

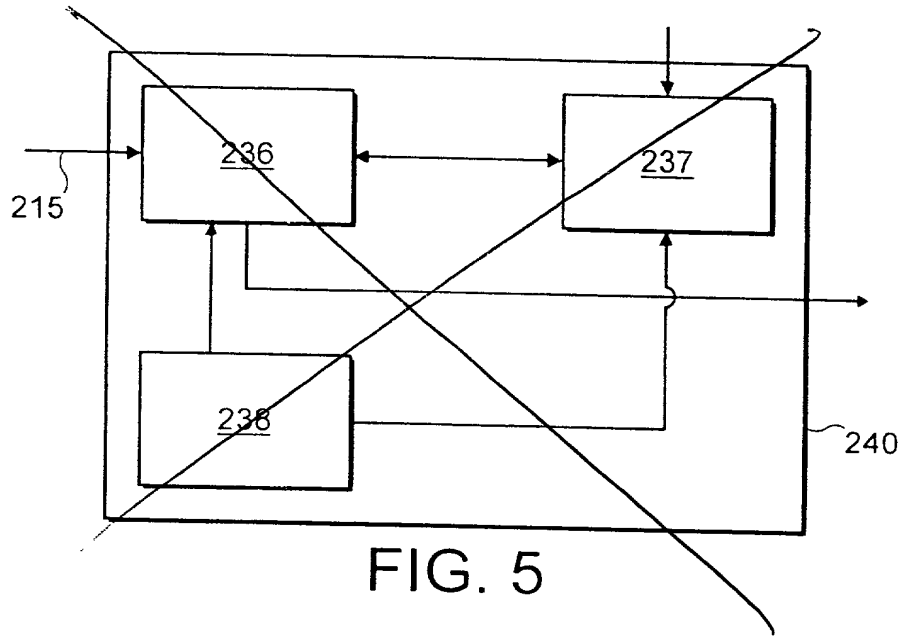

236
237
215
238
240

FIG. 5

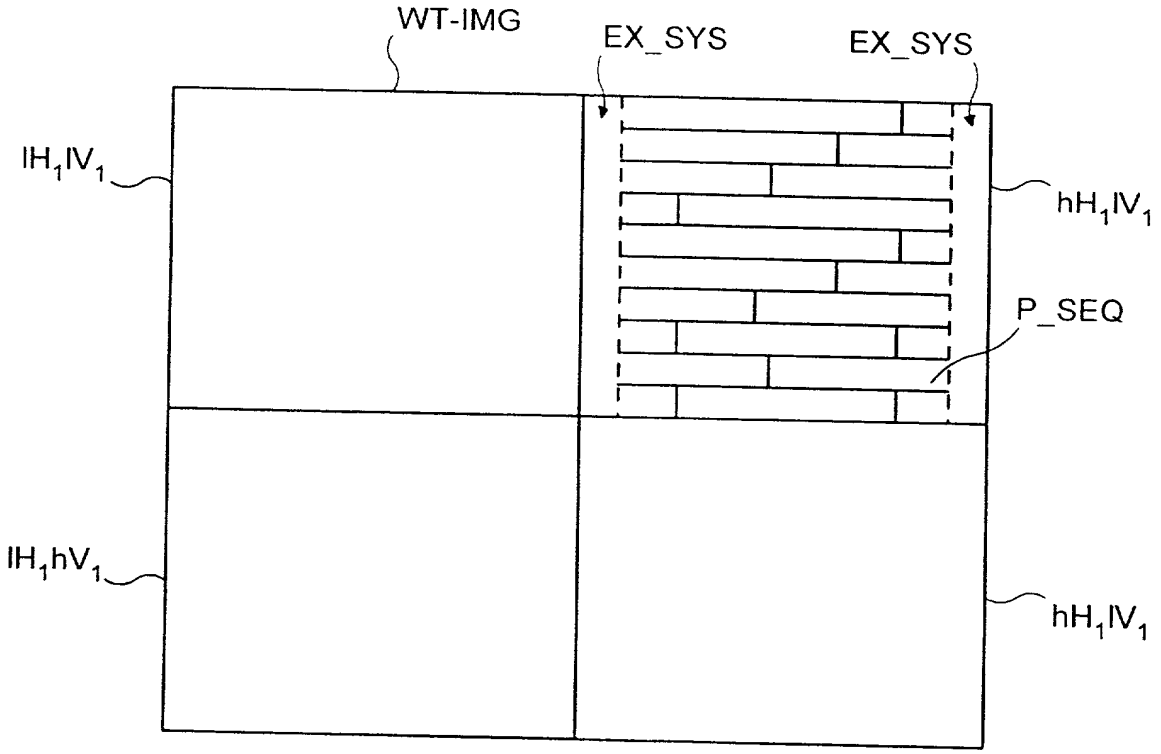

WT-IMG
EX_SYS
EX_SYS
lH_1lV_1
hH_1lV_1
P_SEQ
lH_1hV_1
hH_1lV_1

FIG. 6

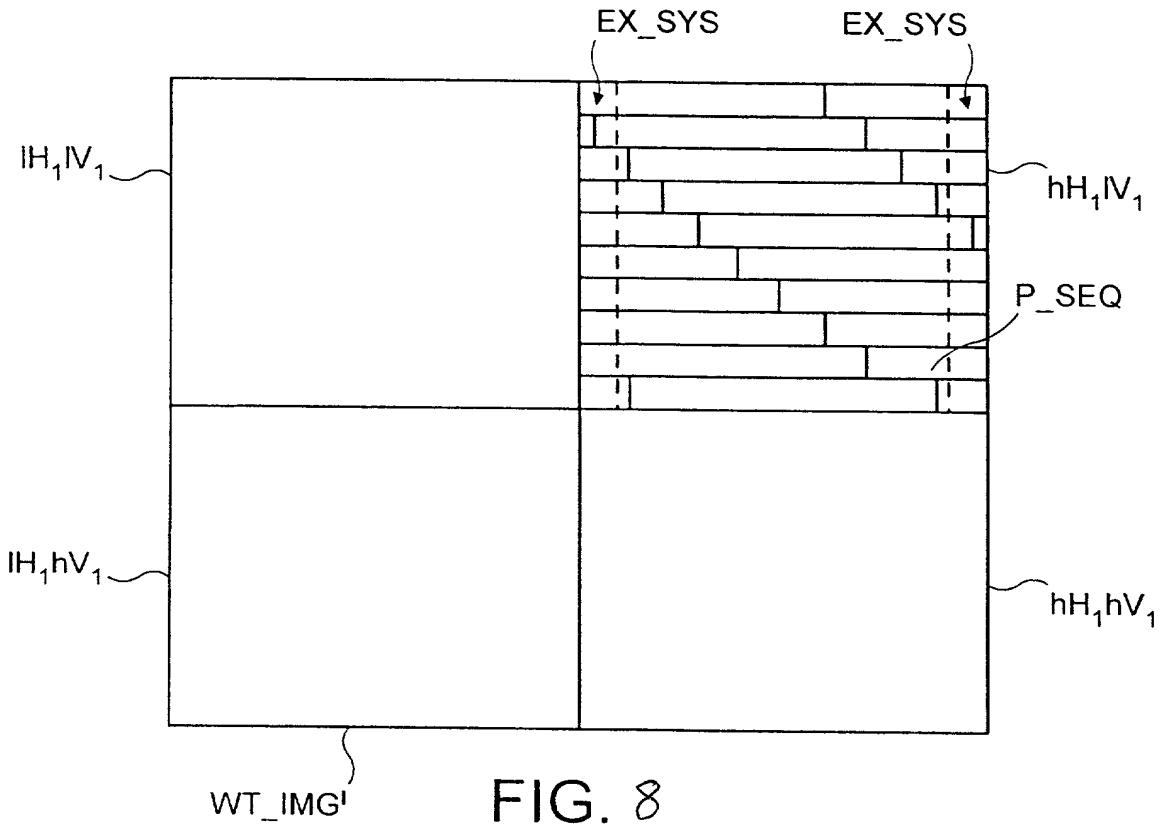

EX_SYS
EX_SYS
lH1lV1
hH1lV1
P_SEQ
lH1hV1
hH1hV1
WT_IMG'

FIG. 8

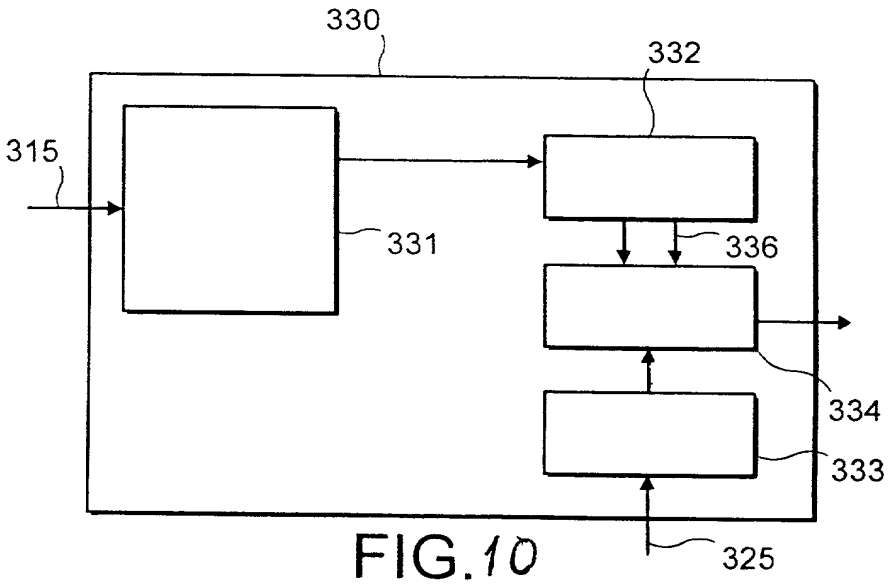

330
332
315
331
336
334
333
325

FIG.10

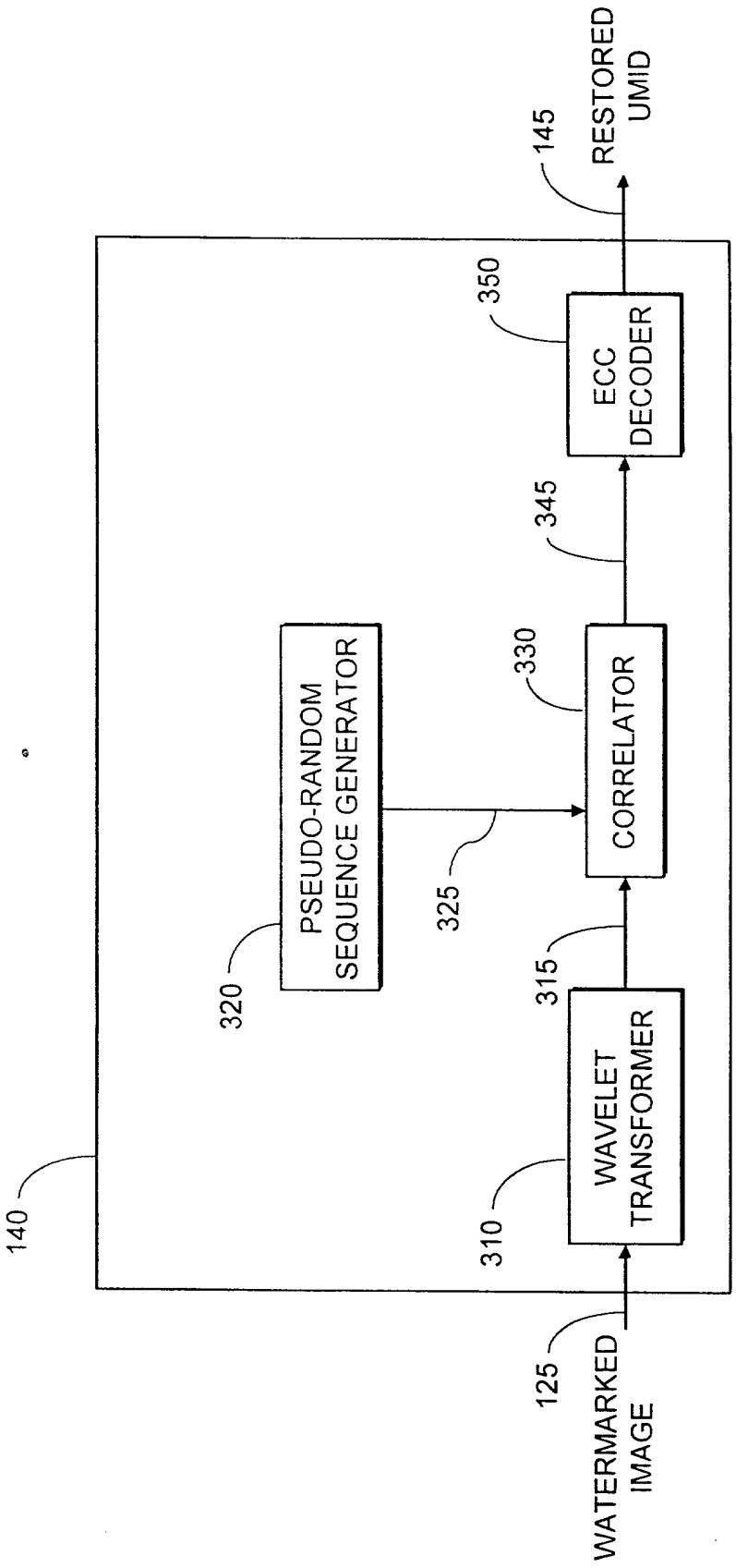

140
WATERMARKED IMAGE
125
WAVELET TRANSFORMER
310
315
PSEUDO-RANDOM SEQUENCE GENERATOR
320
325
CORRELATOR
330
345
ECC DECODER
350
145
RESTORED UMID

FIG. 9

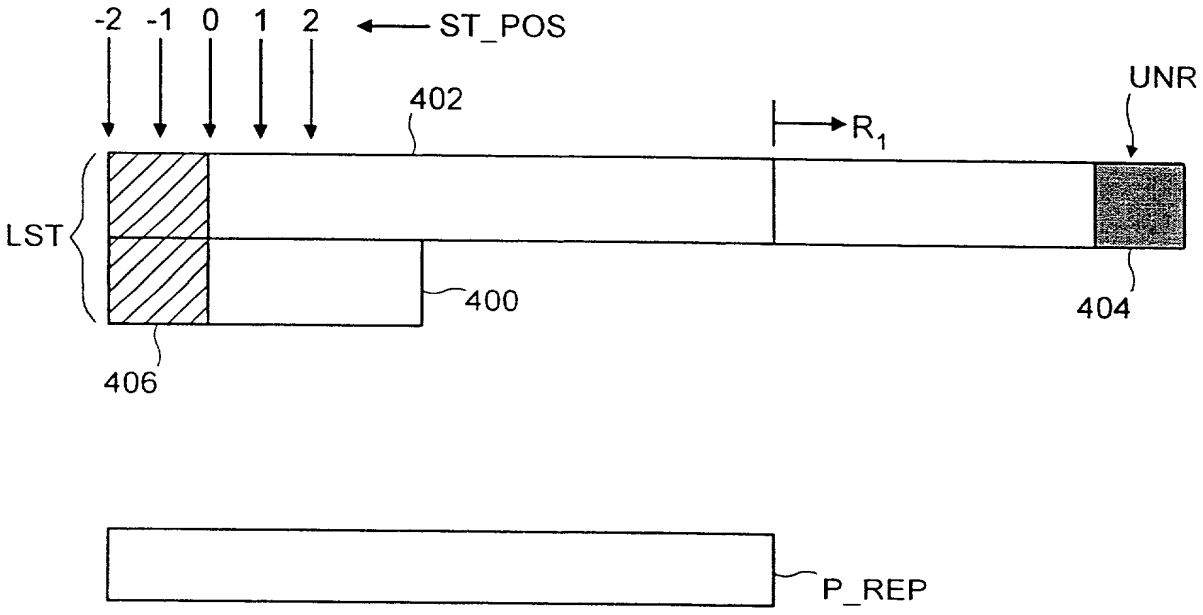

-2
-1
0
1
2
ST_POS
402
UNR
R_1
LST
400
404
406
P_REP

FIG. 12

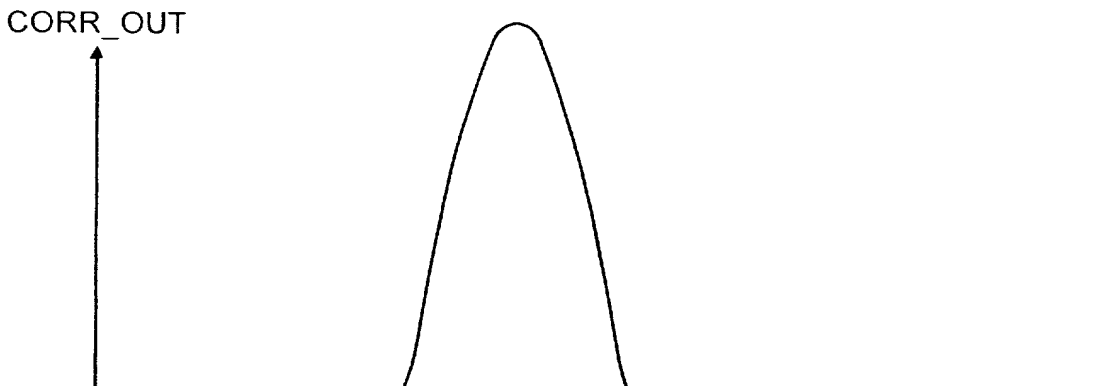

CORR_OUT
ST-POS
-3
-2
-1
0
1
2

FIG. 13

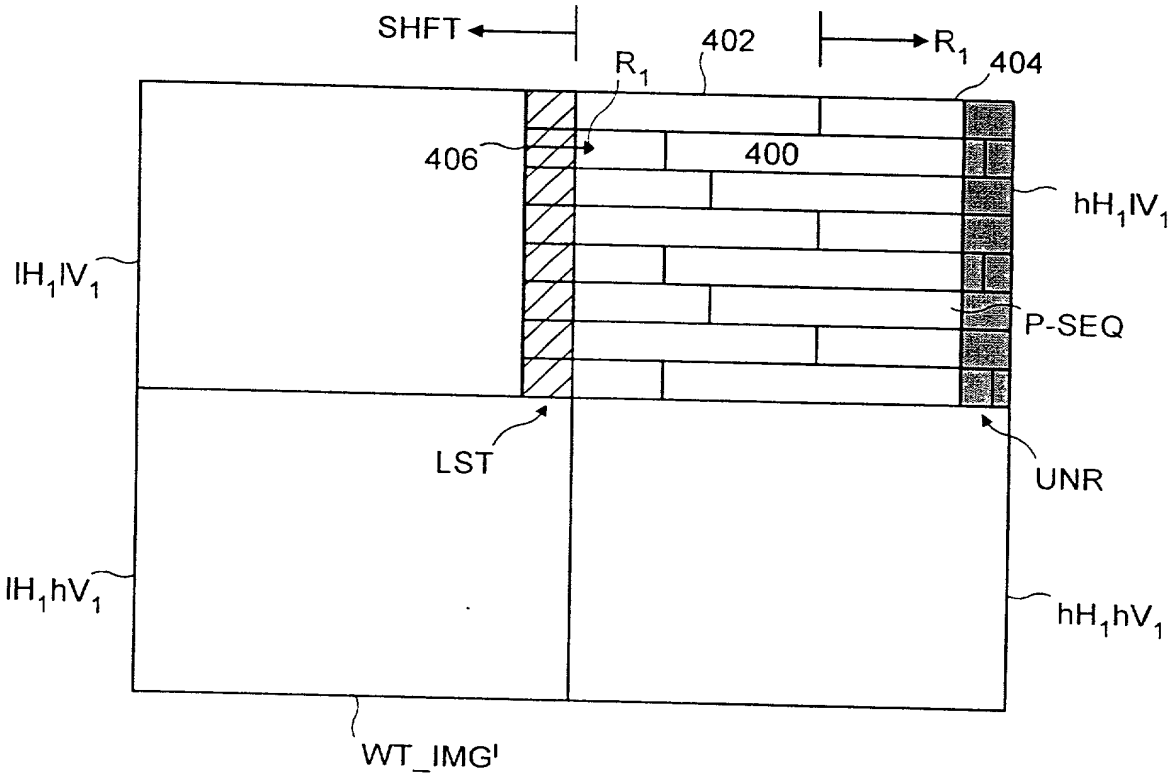

SHFT
R1
402
R1
404
406
400
hH1IV1
lH1lV1
P-SEQ
LST
UNR
lH1hV1
hH1hV1
WT_IMG'

FIG. 11

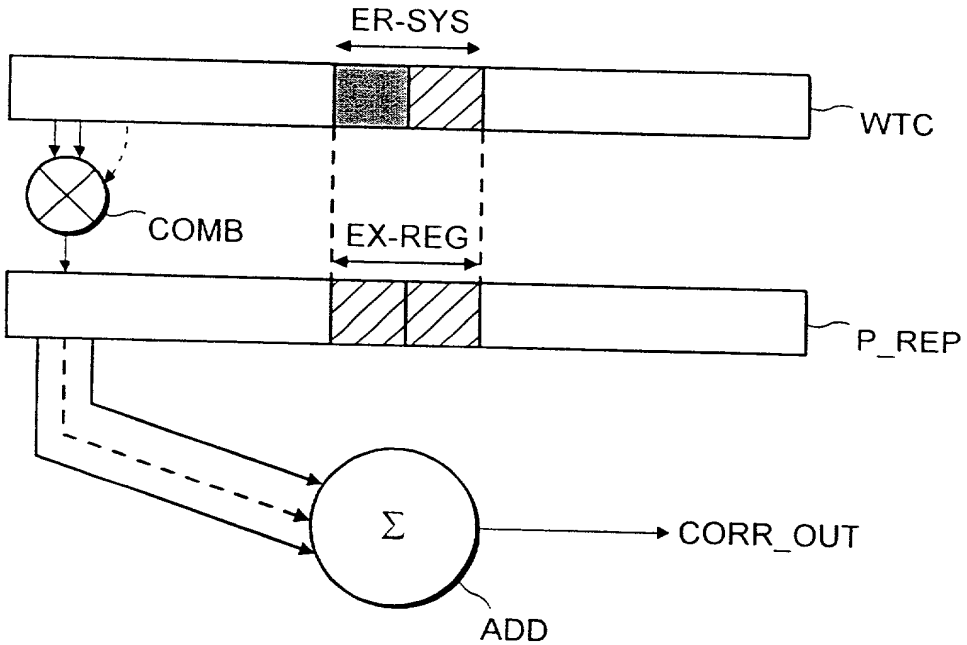

ER-SYS
WTC
COMB
EX-REG
P_REP
Σ
CORR_OUT
ADD

FIG. 14

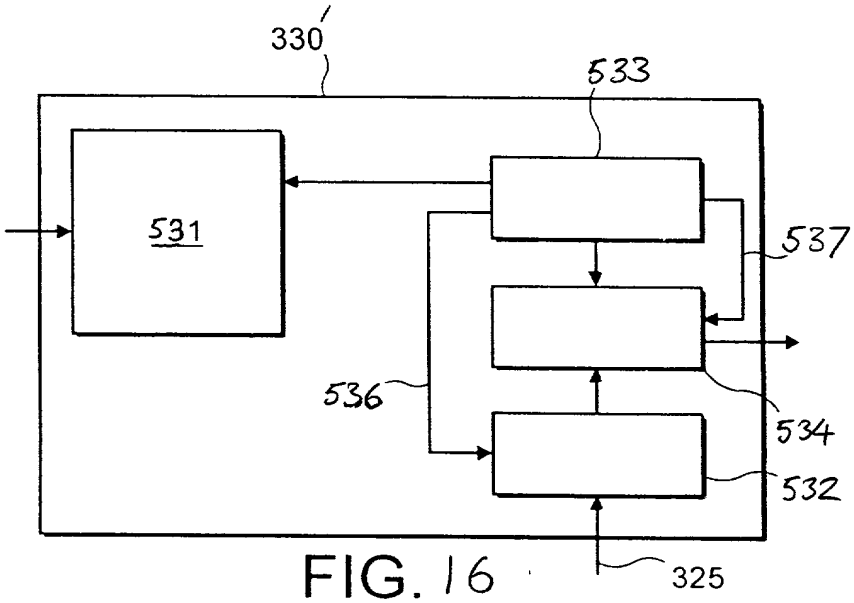


FIG. 16

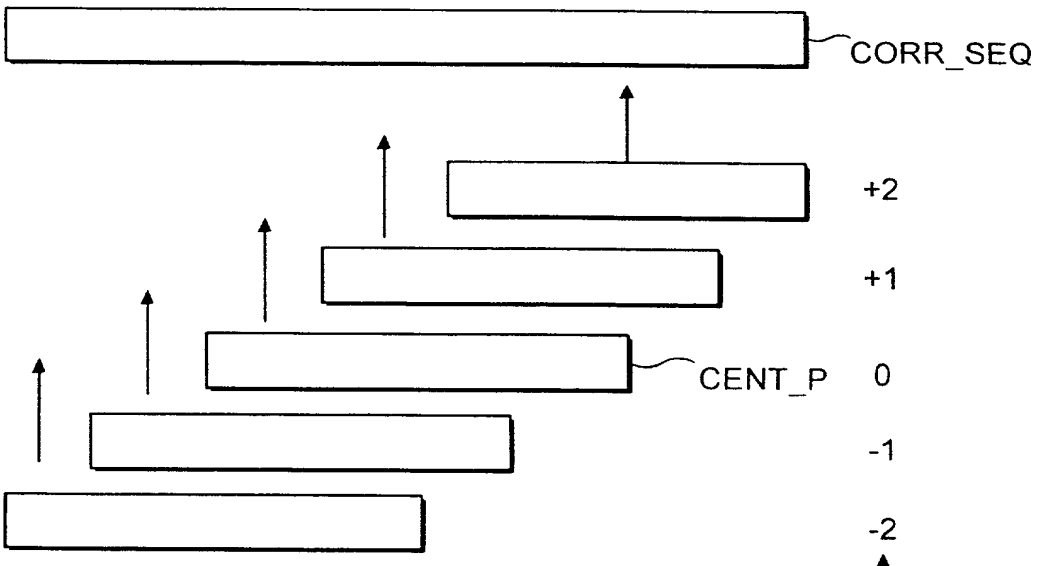


FIG. 15

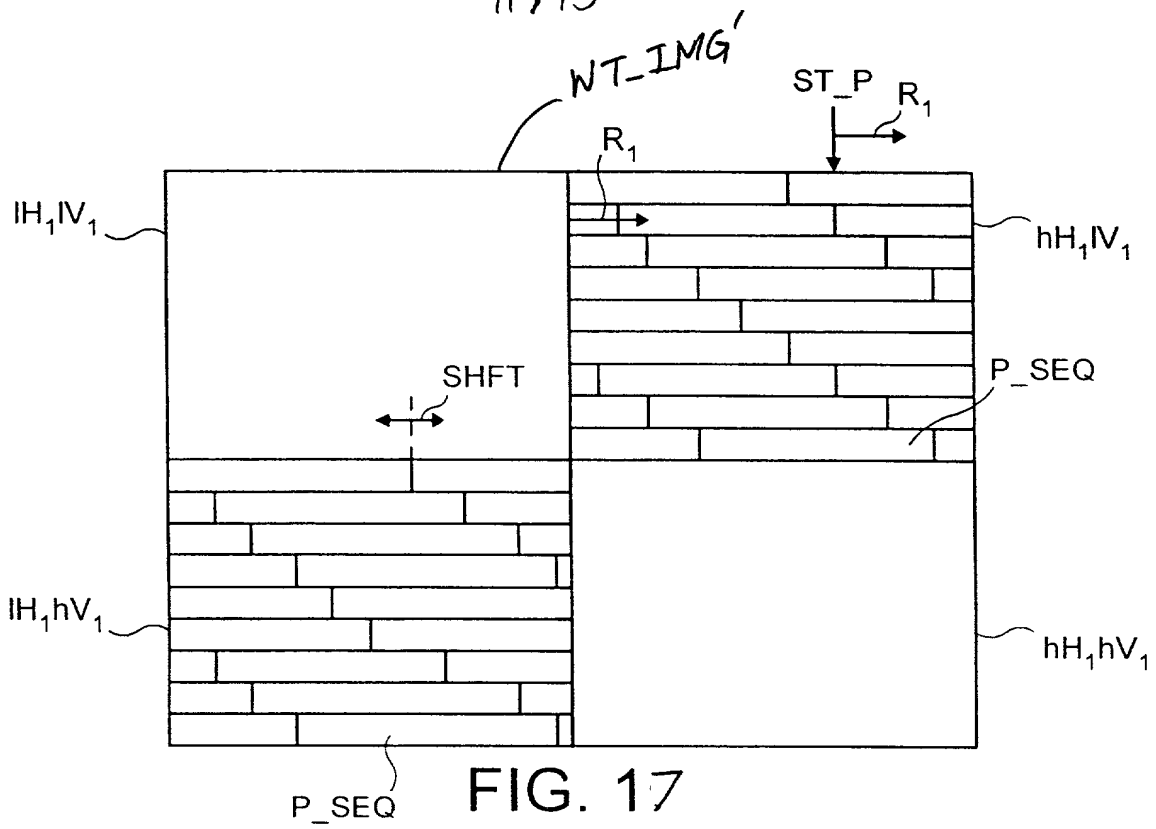


FIG. 17

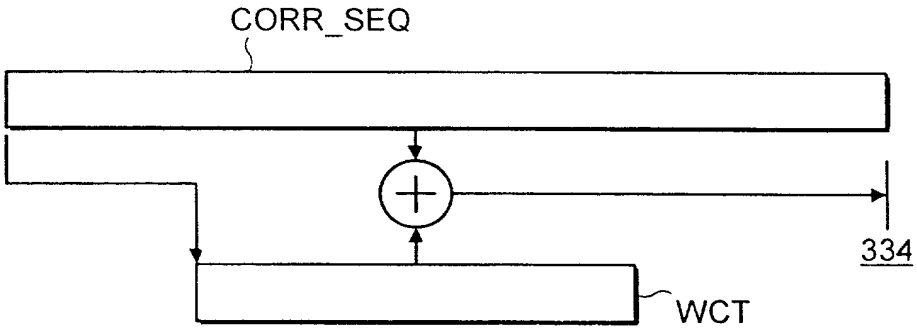


FIG. 18

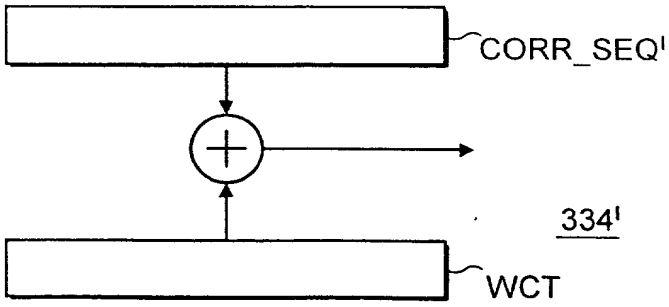


FIG. 20

20020196 - 102504

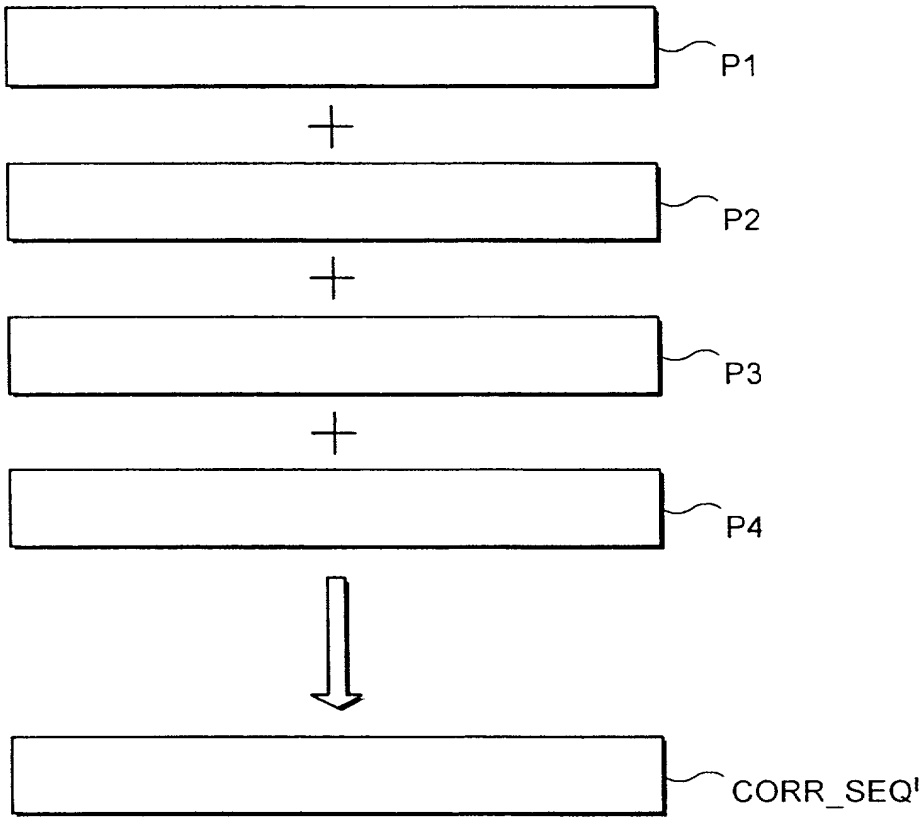


FIG. 19

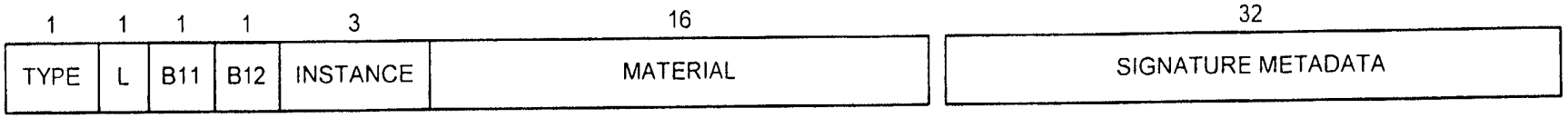
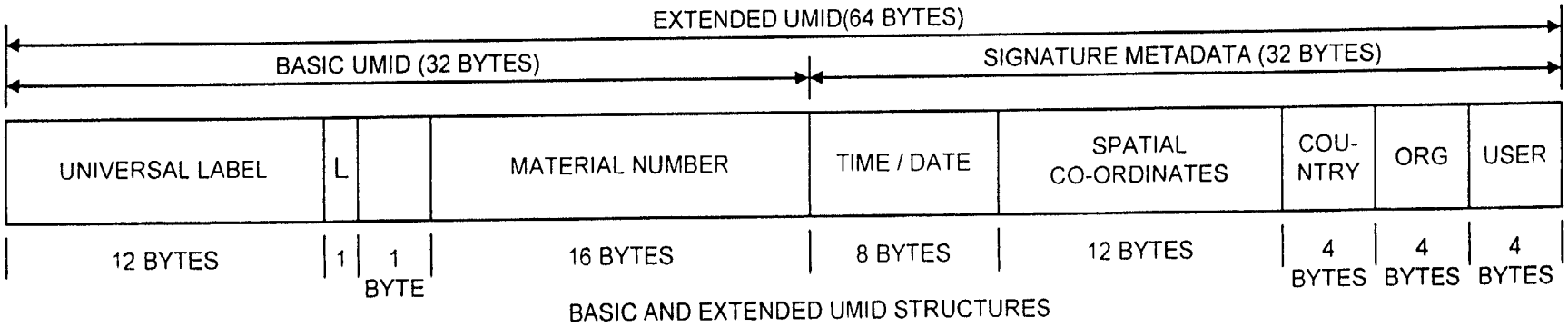


FIG. 21A



BASIC AND EXTENDED UMID STRUCTURES

FIG. 21B